APPENDIX F

SCOUT

Structural Loads

For Scout the worst case loads must include a combination of steady-state acceleration with low frequency transient and vibroacoustic levels; spin forces are a major contributor to the limit loads to be applied and must be determined on a case-by-case basis. The maximum expected axial acceleration levels experienced during third- and fourth-stage thrusting are given in Table F-1. The maximum expected lateral acceleration is approximately 4g. The lateral acceleration levels determined by coupled loads are very dependent on the spacecraft configuration. The project should obtain a coupled loads analysis as early as possible to determine these levels.

Table F-1
SCOUT
Axial Acceleration

Payload Weight kg (lb)	3rd Stage (G)	4th Stage (G)
45.4 (100)	11.0	18.1
90.8 (200)	10.4	13.0
136.2 (300)	9.7	10.4
181.6 (400)	9.2	8.8
227 (500)	8.7	7.7

Acoustics

The qualification and acceptance acoustic noise levels are given in Table F-2.

Spacecraft Random Vibration

The spacecraft random vibration test levels are given in Table F-3.

Table F-2
SCOUT
Acoustic Test Levels
(Inside Payload Fairing)

One-Third Octave Center Frequency (Hz)	Noise Level (dB) re: .00002 Pa	
	Qualification	Acceptance
50	124	121
63	124	121
80	124	121
100	124	121
125	124	121
160	124.5	121.5
200	125.5	122.5
250	126.5	123.5
315	127.5	124.5
400	129	126
500	129	126
630	129	126
800	128.5	125.5
1000	128	125
1250	127.5	124.5
1600	127	124
2000	126	123
2500	125	122
3150	124.5	121.5
4000	123	120
5000	122	119
6300	121.5	118.5
8000	121	118
10000	120.5	117.5
Overall	140	137

Table F-3
SCOUT
Spacecraft Random Vibration

Frequency (Hz)	ASD Level (G^2/Hz)	
	Qualification	Acceptance
0-100	.0028	.0014
100-500	+5 dB/oct	+5 dB/oct
500-2000	.04	.02
Overall	8.2 G_{rms}	5.8 G_{rms}

Mechanical Shock

There are two shock spectrum requirements for Scout payloads. Table F-4 give the spacecraft shock spectrum levels associated with higher frequency separation events, and Figures F-1 and F-2 give the qualification and acceptance levels associated with low-frequency transients. For the latter test, the spacecraft and adapter, attached to a vibrator, shall be excited by a complex acceleration transient; the positive and negative shock spectra of the applied transient shall match the reference levels within the allowed tolerance band for the three values of Q (damping) given at each one-third octave center frequency. The transient shall be applied one time in the thrust axis.

As an alternative to the low-frequency transient test, a three axis swept sine vibration test may be performed. The specifications for the sine test are given in Table F-5.

Table F-4
SCOUT
Shock Spectra
Q=10

Frequency (Hz)	Shock Response Spectrum (G)	
	Qualification	Acceptance
100	14	10
100-600	+10 dB/oct	+10 dB/0ct
600-2000	280	200

Table F-5
SCOUT
Sine Vibration
(Alternative for Transient)

Axis	Frequency (Hz)	Level (G_{peak})	
		Qualification	Acceptance
Thrust	5-43	24 cm/s (9.4 ips)	17.8 cm/s (7.0 ips)
	43-100	6.25	5.0
	100-200	5.0	4.0
Lateral	5-25	7.9 cm/s (3.1 ips)	6.4 cm/s (2.5 ips)
	25-80	1.25	1.0
	80-200	1.5	1.2
Sweep Rate		6 oct/min	

Balance - The acceptable launch mass unbalance of the payload with respect to the axis passing through the center of the support ring normal to the plane of the support ring is:

Dynamic unbalance: 36,500 gm-cm^2 (200 oz-in^2)

Static Unbalance: 800 gm-cm (12 oz-in).

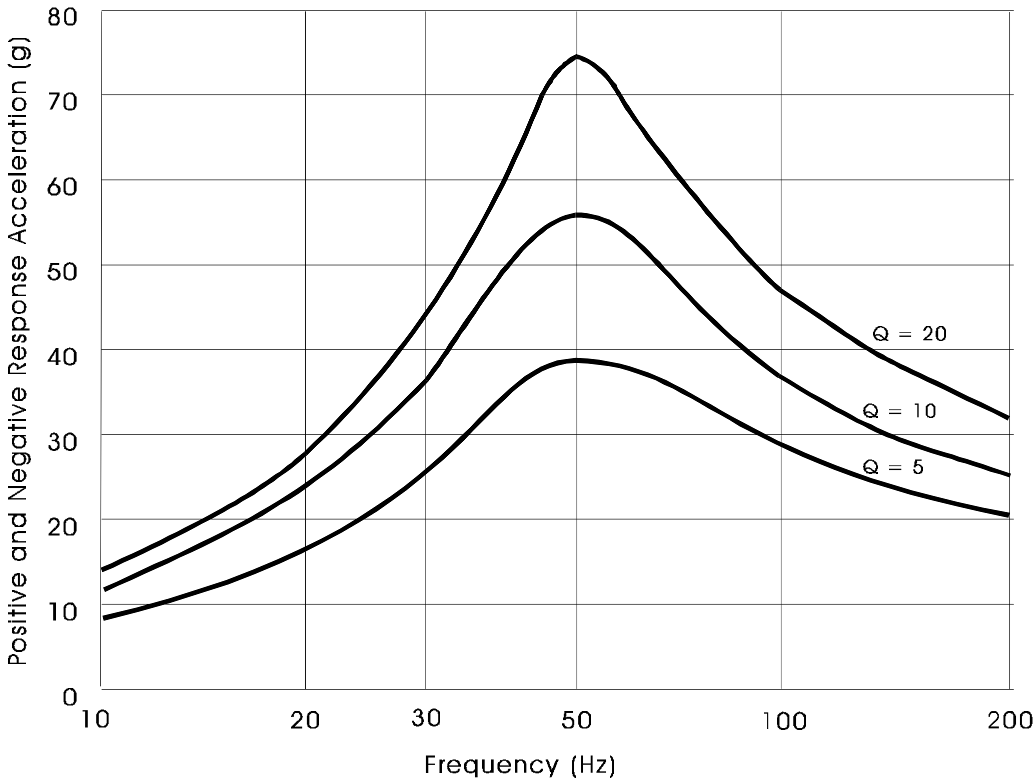

Figure F-1 Spacecraft Qualification Thrust Axis, Transient Shock Spectra

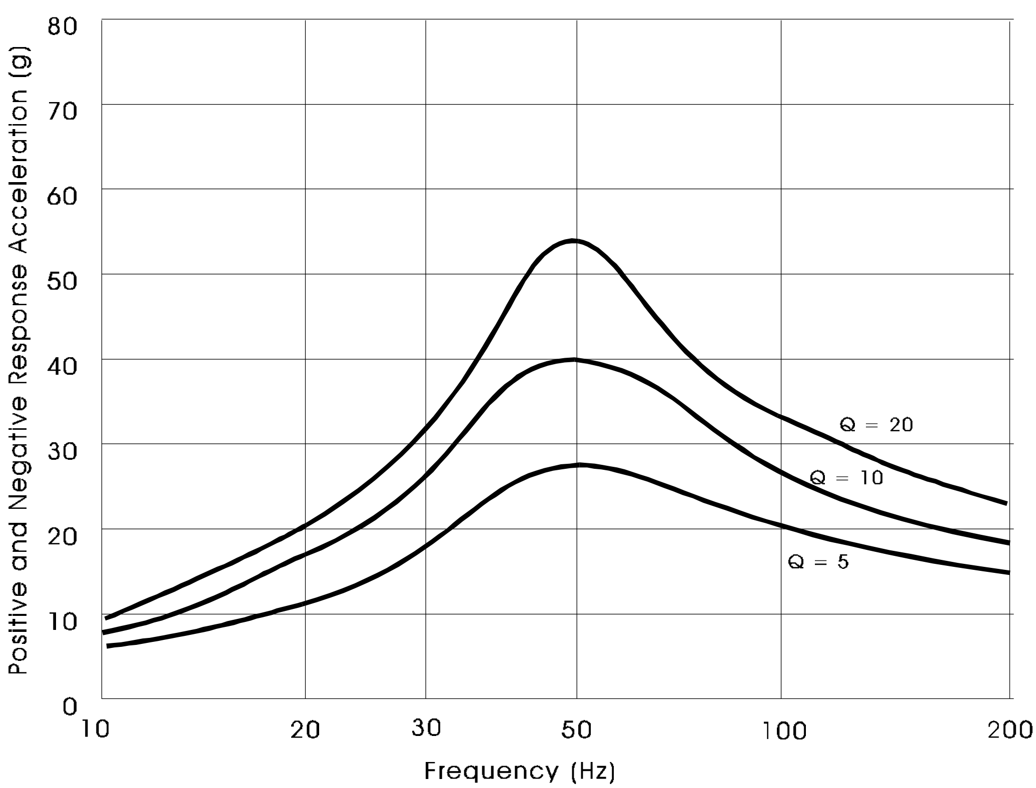

Figure F-2 Spacecraft Flight Acceptance Thrust Axis Transient Shock Spectra